2.5 COUPP Phase II Hazard Analysis

Activity	Hazard	Mitigation
Move and Reinstallation		
Mechanical Installation	Lifting computer, UPS, etc	Heavy items on bottom of racks Lift with legs – two people where appropriate
	Pinch Hazards (relay rack, heavy items)	Communicate prior to lifting
Moving racks, pressure vessel and hydraulic cart by forklift.	Crush hazard by dropping.	Only trained SNOLAB personnel to arrange loads and perform lift. COUPP personnel to stand clear during lift.
	Crush hazard by toppling of racks.	Racks to be lifted from top of the rack. Monitors, keyboard trays, and PXI crate to be removed from racks prior to lift.
Instrumentation wiring and cabling – all done with power off	Tripping hazard	Route and secure cables along cable trays or rack hardware. Keep floor clear.
Stepwise electrical turn on	None	
Replumbing heater/chiller	Burn hazard, water up to 60°C.	Ensure NESLAB bath temperature is below 50°C before draining plumbing.
Glycol Handling[1]		
Draining pressure vessel, incl. lifting pressure vessel above drain level.	Splashing	Wear gloves, tyvek coveralls, and indirectly ventilated goggles.
	High vapour concentration	Keep container openings less than 15cm (6”) in diameter, or use a respirator.
	Crush and pinch hazards	Communicate prior to lifting. Stay clear 1m or pressure vessel during lift.
	Overflowing containers	Use butterfly valve to control flow. Place tip of drain pipe 2” below top of container to indicate when container is full.
Refilling pressure vessel.	Same as above minus crush/pinch hazard.	Same as above. Wear respirator when operating vacuum pump. Use liquid trap on vacuum pump
	Flammability of residue containers	Clean and rinse residue containers. Mark containers as clean.
	Shattering inner vessel	Carefully plan work. Monitor inner vessel position continually.

[1] Also refer to Vapour Exposure Hazard Analysis.

Glycol spill cleanup	Skin Contact	Wear gloves. Wear tyvek coveralls if contamination of the body is likely.
	High vapour concentration	Wear respirators if the spill area is > 300cm^2 or 20 cm (7.5") in diameter.
Charge Accumulator Tank AC-2	Glycol spray.	Use liquid trap with vacuum pump. Ensure MV-4 is closed before pumping down.
CF_3I Handling[2]		
CF_3I Transfer Operations	Gas Exposure	Vacuum leak check closed system before operations. Snoop check for leaks or use a refrigerant leak detector when operations start.
	Compressed Gas	Wear goggles when charging with CF3I.
	Liquid Spray	Ensure all valves and transfer pipes are high compared to transfer bottle or inner vessel. Do not touch escaped liquid.
	Line Purging	Ensure all valves are closed. Vent CF_3I away from body.
	Large Spill	Evacuate upwind towards the back of J Drift or towards the north end of F drift, away from the air handlers. Wait 5 minutes after end of release before reentering the vicinity of the experiment.
Compressed Air Handling		
Charging system	Compressed Gas	Wear goggles when charging the system. Leak check.
Changing cylinders	Compressed Gas	Minimize vented pressure. Close valves on both sides of regulator prior to removing. Leak check with snoop when reinstalling.
Other Hazards		
Heater/Chiller Operation	Temperature excursion	Builtin temperature limits and use of water in the bath rather than water+glycol
Exercising Hydraulic Cart	Pinch point on worm gear	Guard on worm gear
Moving water shielding	Tank rupture	Ensure water tanks are empty prior to moving. Lift only from designated points.
	Crush hazard	Lifts to be performed only by designated SNOLAB personnel. Tanks to be secured against toppling or barricaded before end

[2] Also refer to Vapour Exposure Hazard Analysis.

		of shift.
Emergency Situations		
Blowing a pressure relief	Glycol spray	Evacuate to a safe distance. Flush glycol from eyes using eyewash bottle if required, or from hands using mop bucket and DO water.
	CF3I release	Evacuate from downwind of the experiment. Wait for 5 minutes after end of release to reenter.
	Save access to emergency supplies	Locate emergency supplies in COUPP cabinet in F drift just upwind, north, of J drift, or in J drift upwind of the hydraulic cart. Ensure the cabinet and eyewash bottles are easily found.
Electrical or Operational Problem	Impared access to electrical shutoff	Post shutoff procedures including breaker numbers. Place UPS emergency shutoff button next to COUPP cabinet.
SNOLAB emergencies	Follow appropriate SNOLAB procedures.	